Claims:

1. Method for simultaneous estimation of locations of a number of mobile stations in a mobile radio communication system that includes a number of base station cells, a plurality of mobile stations, and a central processing station, the method comprising the steps of:

creating "Timing Block Method" for TOA signal measurements on base stations by using additional correlators;

using additional correlators in the receiver base station antennas for TOA measurements in synchronized cell systems on arriving signals on each of said antennas;

using additional supporting correlator on each base station receiver for time measurements of signals between one of said base station antennas and an additional antenna; and

using signal time delays measured in short time intervals of a few nanoseconds with phase shift measurements with inaccuracy not exceeding 0.5 degrees.

2. The method of claim 1, comprising using the additional correlators in the receiver BS antennas for TOA measurements in synchronized cell systems on arriving signals for time stop calculations on each of said antennas.

3. Method as described in claim 1 including forwarding location data and timing information obtained from a plurality of base stations.

4. The method of claim 1 comprising:

using a server capable of processing in real time the location and timing data obtained from all base stations and transforming them into appropriately structured data suitable for storing in a database and being used in further mathematical computations;

storing and updating location and timing data obtained from all base stations relating to a plurality of mobile stations in a database;

using software to effect calculations of TOA, TDOA, attenuation and other quantities relevant to location of mobile stations;

calculating TOA, TDOA, attenuation and other quantities relevant to location of mobile stations, with algorithms that use direct and exact methods; and

estimating locations of a plurality of mobile stations based on the computed TOA, TDOA, attenuation and other relevant quantities and capable of handling gross measurement errors and position ambiguities resulting from multipath phenomena and other possible interference by the use of statistical algorithms.

5. Method for operator-initiated continuous location estimation of signals traveling from base stations to client mobile stations operating in "idle" stand-by mode and in opposite directions comprising:

emitting a position request signal from at least one base station through a control channel;

emitting a position signal from each of the mobile stations receiving the location enquire signal from at least one base station, the location signal containing identification information on the corresponding mobile stations; and

receiving the position signal from each of the mobile stations in base stations neighboring the corresponding mobile stations.

6. Method as described in claim 5 including forwarding location data and timing information obtained from a plurality of base stations.

7. Method of determination of mobile station coordinates by receiving and processing of the radio signals from corresponding mobile station in several base station located at various distances from each other in single cell configuration comprising the steps of:

measuring signal in base stations, which also conduct monitoring of the mobile station and execute synchronization of local oscillator in the mobile station when it answers a location enquiry signal in one of the base stations;

synchronization of the signal frequencies and phasing as realized by GPS clocks on all base station oscillators in a given cell whereas base station transmission of position signals is in a form of "windows frames" in a predetermined CDMA standard for all mobile stations;

measuring time delays as a time differences between the signal leaving the supporting correlator and signal arriving on the receiver correlator located in the base station; and

transmitting all data to the Central Processing Station via standard digital interface.

8. Method as described in claim 7 including forwarding location data and timing information obtained from a plurality of base stations.

9. Method of determination of mobile station coordinates by utilizing the method of time difference of arrival (TDOA) of signals by synchronizing signals from two base stations, the method comprising the steps of:

utilizing a supporting correlator for receiver and an additional antenna positioned close to one of said base station antenna receiver whereas these additional antennas are collocated at all base station and participate in location service of the mobile stations in a given cell;

applying the TDOA method in all of base stations after the monitoring base station executes synchronization of local oscillator in specific mobile station and it answers the location enquiry signal;

applying the TDOA method for measuring electromagnetic waves between all antennas equipped with supporting correlators and with the correlators of all receiver base station antennas; and

obtaining time delays as differences of phases in signals received by all antennas.

10. Method as described in claim 9 including forwarding location data and timing information obtained from a plurality of base stations.

11. Method of communication comprising taking measurements of a time interval in case of interruption of measuring process in windows frames in an IS-95 CDMA operating system.

12. Method as described in claim 11 including forwarding location data and timing information obtained from a plurality of base stations.

13. Method of communication comprising taking phase shift measurements in case of the phase interruption of the measuring process of windows frames in an IS-95 CDMA operating system.

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14. Method as described in claim 13 including forwarding location data and timing information obtained from a plurality of base stations.

15. Apparatus for determination of an mobile station location by using base stations base stations operating in a predetermined CDMA standard comprising:

a timestamp clock for time delays working with the intervals of interruption of window frames in CDMA operating systems;

an additional control communication channel used for receiving location signals from two antennas;

a descrambler for keeping the results of time delay measurements and transmissions in the PC computer for calculation of coordinates of mobile station's using mathematical algorithms described below.

16. Apparatus as described in claim 15 including means for locating data and timing information obtained from a plurality of base stations.

17. Apparatus as described in claim 15, in which the central processing station comprises:

server capable of processing in real time the location and timing data obtained from all base stations and transforming them into appropriately structured data suitable for storing in a database and being used in further mathematical computations;

database for storing and updating location and timing data obtained from all base stations relating to a plurality of mobile stations;

software for calculating TOA, TDOA, attenuation and other quantities relevant to location of mobile stations;

mathematical algorithms calculating TOA, TDOA, attenuation and other quantities relevant to location of mobile stations, that use direct and exact (as opposed to approximations) methods; and

statistical algorithms (software) for estimating locations of a plurality of mobile stations based on the computed TOA, TDOA, attenuation and other relevant

quantities and capable of handling gross measurement errors and position ambiguities resulting from multipath phenomena and other possible interference.

18. Apparatus as described in claim 15 including wherein the predetermined CDMA standard is the IS-95 CDMA standard.

19. Central processing station capable of simultaneous estimation of locations of a number of mobile stations in a mobile radio communication system that includes a number of base station cells, a plurality of mobile stations, the central processing station comprising:

server capable of processing in real time the location and timing data obtained from all base stations and transforming them into appropriately structured data suitable for storing in a database and being used in further mathematical computations;

database for storing and updating location and timing data obtained from all base stations relating to a plurality of mobile stations; and

software for calculating TOA, TDOA, attenuation and other quantities relevant to location of mobile stations,

wherein mathematical algorithms are used for calculating TOA, TDOA, attenuation and other quantities relevant to location of mobile stations, that use direct and exact (as opposed to approximations) methods, and wherein statistical algorithms are used for estimating locations of a plurality of mobile stations based on the computed TOA, TDOA, attenuation and other relevant quantities and capable of handling gross measurement errors and position ambiguities resulting from multipath phenomena and other possible interference.